



Universitas Negeri Surabaya
Faculty of Mathematics and Natural Sciences
Bachelor of Mathematics Education Study Program

Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight	SEMESTER	Compilation Date																																
Integral Calculus	8420204083		T=4 P=0 ECTS=6.36	2	July 17, 2024																																
AUTHORIZATION	SP Developer		Course Cluster Coordinator	Study Program Coordinator																																	
	Dr. Endah Budi Rahaju, M.Pd.																																	
Learning model	Case Studies																																				
Program Learning Outcomes (PLO)	PLO study program that is charged to the course																																				
	Program Objectives (PO)																																				
	PLO-PO Matrix																																				
		<table border="1" style="margin: auto;"> <tr><td style="width: 30px;">P.O</td></tr> </table>				P.O																															
P.O																																					
	PO Matrix at the end of each learning stage (Sub-PO)																																				
	<table border="1" style="margin: auto;"> <tr> <td rowspan="2" style="width: 30px;">P.O</td> <td colspan="16" style="text-align: center;">Week</td> </tr> <tr> <td style="width: 20px;">1</td><td style="width: 20px;">2</td><td style="width: 20px;">3</td><td style="width: 20px;">4</td><td style="width: 20px;">5</td><td style="width: 20px;">6</td><td style="width: 20px;">7</td><td style="width: 20px;">8</td><td style="width: 20px;">9</td><td style="width: 20px;">10</td><td style="width: 20px;">11</td><td style="width: 20px;">12</td><td style="width: 20px;">13</td><td style="width: 20px;">14</td><td style="width: 20px;">15</td><td style="width: 20px;">16</td> </tr> </table>				P.O	Week																1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16																					
Short Course Description	Critically examine the concept of indefinite integrals (antiderivatives), real functions with one variable (definition of antiderivatives, integration techniques), definite integrals of real functions with one variable (understanding, properties, Fundamental Theorem of Calculus, and improper integrals), use of certain integrals of real functions with one variable (parametric equations, polar coordinates, flat area, arc length, volume of rotating objects, volume of objects whose cross-section is known, rotating surface area, and center of mass) through active learning with the question and answer method assisted by presentation media and Maple.																																				
References	Main :																																				
	<ol style="list-style-type: none"> 1. [1] Sulaiman, R. 2015. Integral dan Aplikasinya. Surabaya: Zifatama 2. [2] Stewart, J. 2012. Calculus 7th Edition. Belmont: Brooks/Cole 3. [3] Thomas Jr., G., et. al. 2010. Thomas Calculus 12th Edition. Boston: Addison-Wesley 4. [4] Purcell, E. J. et al. 2010. Kalkulus Jilid 1 Edisi Kedelapan (Terjemahan). Jakarta: Erlangga 5. [5] Moesono, D. 1993. Kalkulus II (Edisi Revisi). Surabaya: University Press Surabaya 																																				
	Supporters:																																				
Supporting lecturer	Abdul Haris Rosyidi, S.Pd., M.Pd. Ika Kurniasari, S.Pd., M.Pd. Budi Priyo Prawoto, S.Pd., M.Si. Ahmad Wachidul Kohar, S.Pd., M.Pd. Dayat Hidayat, S.Pd., M.Pd., M.Si.																																				
Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials [References]	Assessment Weight (%)																														
		Indicator	Criteria & Form	Offline (offline)	Online (online)																																
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)																														

1	Understand the concept of indefinite integrals (anti-derivatives)	<ol style="list-style-type: none"> 1. Define the concept of indefinite integral in your own language. 2. Determine the result of an indefinite integral from a real function of one variable 3. Proving theorems on indefinite integrals 4. Using indefinite integral theorems to determine the results of indefinite integrals of real functions of one variable 5. Solving problems involving critical thinking skills related to indefinite integrals 		Giving Assignments, Questions and Answers and Discussions 8 X 50			0%
2	Understand the concept of indefinite integrals (anti-derivatives)	<ol style="list-style-type: none"> 1. Define the concept of indefinite integral in your own language. 2. Determine the result of an indefinite integral from a real function of one variable 3. Proving theorems on indefinite integrals 4. Using indefinite integral theorems to determine the results of indefinite integrals of real functions of one variable 5. Solving problems involving critical thinking skills related to indefinite integrals 		Giving Assignments, Questions and Answers and Discussions 8 X 50			0%

3	Understand the concept of integrals of course	<ol style="list-style-type: none"> 1. Define definite integral 2. Determining the definite integral of a real function of one variable by definition 3. Proving theorems on definite integrals 4. Using definite integral theorems to determine the definite integral of a real function of one variable 5. Solving problems involving critical thinking skills is related to definite integrals 		Problem Solving, Questions and Answers and Discussion 8 X 50			0%
4	Understand the concept of integrals of course	<ol style="list-style-type: none"> 1. Define definite integral 2. Determining the definite integral of a real function of one variable by definition 3. Proving theorems on definite integrals 4. Using definite integral theorems to determine the definite integral of a real function of one variable 5. Solving problems involving critical thinking skills is related to definite integrals 		Problem Solving, Questions and Answers and Discussion 8 X 50			0%

5	Understand integration techniques	<ol style="list-style-type: none"> 1. Determine the results of indefinite integrals and definite integrals from real functions of one variable by substitution. 2. Using maple to determine the results of various types of indefinite and definite integrals 3. Solve problems that involve critical thinking skills on technical topics 		Questions and Answers and Discussion 8 X 50			0%
6	Understand integration techniques	<ol style="list-style-type: none"> 1. Determine the results of indefinite integrals and definite integrals from real functions of one variable by substitution. 2. Using maple to determine the results of various types of indefinite and definite integrals 3. Solve problems that involve critical thinking skills on technical topics 		Questions and Answers and Discussion 8 X 50			0%

7	Understand integration techniques	<ol style="list-style-type: none"> 1. Determine the results of indefinite and definite integrals from real functions of one variable using partial integrals 2. Determine the indefinite and definite integrals of rational functions 3. Using Maple to determine the results of various types of indefinite and definite integrals 4. Solve problems involving critical thinking skills on the topic of integration techniques 5. Express opinions and questions 		Questions and Answers and Discussion 4 X 50		0%
8	U.S.S			4 X 50		0%

9	Using integrals to determine the area under the curve and the volume of rotating objects as well as the volume of objects of known cross-section	<ol style="list-style-type: none"> 1. Determines the area above the coordinate axes. 2. Determines the area under the coordinate axes. 3. Determine the area between two curves. 4. Solving problems that involve critical thinking skills is related to the area under the curve 5. Determining the volume of a rotating object using the disk method 6. Determining the volume of a rotating object using the ring method 		Giving Assignments, Questions and Answers and Discussions 8 X 50			0%
10	Using integrals to determine the area under the curve and the volume of rotating objects as well as the volume of objects of known cross-section	<ol style="list-style-type: none"> 1. Determines the area above the coordinate axes. 2. Determines the area under the coordinate axes. 3. Determine the area between two curves. 4. Solving problems that involve critical thinking skills is related to the area under the curve 5. Determining the volume of a rotating object using the disk method 6. Determining the volume of a rotating object using the ring method 		Giving Assignments, Questions and Answers and Discussions 8 X 50			0%

11	Using integrals to determine the area under the curve and the volume of rotating objects as well as the volume of objects of known cross-section	<ol style="list-style-type: none"> 1. Determining the volume of a rotating object using the tube shell method 2. Solving problems that involve critical thinking skills related to the volume of rotating objects 3. Determine the volume of an object whose cross-sectional shape is known 4. Using maple to determine the area and volume of rotating objects 5. Express opinions or questions 		Giving Assignments, Questions and Answers and Discussions 4 X 50			0%
12	Use integrals to determine arc length and surface area of rotating objects	<ol style="list-style-type: none"> 1. Determining the arc length of the curve of a parametric function 2. Determines the arc length of the curve 3. Determines the surface area of a rotating object that occurs when an arc is rotated about one of the coordinate axes 		Giving Assignments, Questions and Answers and Discussions 8 X 50			0%

13	Use integrals to determine arc length and surface area of rotating objects	<ol style="list-style-type: none"> 1. Determining the arc length of the curve of a parametric function 2. Determines the arc length of the curve 3. Determines the surface area of a rotating object that occurs when an arc is rotated about one of the coordinate axes 		Giving Assignments, Questions and Answers and Discussions 8 X 50			0%
14	Use integrals to determine the center of mass	<ol style="list-style-type: none"> 1. Determine the center of mass of the plane area bounded by the curve. 2. Determine the center of mass of the arc between 2 points on the arc. 3. Determine the center of mass of a rotating object. 		Expository, Question and Answer and Discussion 4 X 50			0%

15	Understand the concept of improper integrals	<ol style="list-style-type: none"> 1. Restate the definition of an improper integral where one or both limits are infinite 2. Determine the result of an improper integral where one or both limits are infinite 3. Restate the definition of an improper integral whose integrand is infinite 4. Determine the result of an improper integral whose integrand is infinite 5. Solving problems that involve critical thinking skills related to improper integrals 		Questions and Answers and Discussion 4 X 50			0%
16							0%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
		0%

Notes

1. **Learning Outcomes of Study Program Graduates (PLO - Study Program)** are the abilities possessed by each Study Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program obtained through the learning process.
2. **The PLO imposed on courses** are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
3. **Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
4. **Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
5. **Indicators for assessing** ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
6. **Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
7. **Forms of assessment:** test and non-test.
8. **Forms of learning:** Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
9. **Learning Methods:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
11. **The assessment weight** is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.

12. TM=Face to face, PT=Structured assignments, BM=Independent study.